

David Luftig

## Teaching Information Professionals to Record and Utilize Digital Audio Using Audacity Software

### Section 1

#### Introduction

For this instructional design project, professionals within an academic library will learn how to record, edit, and export digital audio using a computer. This class will take place in a computer laboratory where each computer will be similar. Each computer will be equipped with a USB headset (with microphone). Each computer will have the free software application Audacity loaded on it. The instructor will also have a computer that will be projected to the entire class (so the class can follow along with examples). The topics covered in this class will include how to record, edit, and export digital audio. Concepts of noise floor, clipping/distortion, and sample rate will also be taught.

### Section 2

#### Learning Outcomes

1. Students will be able to utilize Audacity in order to record, edit, and export audio on their computers.
2. Students will be able to utilize Audacity's recording parameters to create recordings with adequate recording levels and an appropriate sample rate.
3. Students will be able to explain the importance of the concepts of "clipping/distortion," "noise floor," and "sample rate" in digital audio.

### Section 3

#### Outcomes to be assessed:

The ability to record, edit, and export digital audio while incorporating concepts of noise-floor, distortion, and sample rate within the final recording.

#### Formative Assessment Method:

For the formative assessment, I'm going to ask the students to quickly write down (or think of) two do's and two don't of the recording process. This formative assessment will be based on the concepts that we have covered up to this point (noise floor, distortion, and sample rate). This activity will take place before the actual recording portion of the class begins. After the students come up with these dos and don'ts we will have a brief class discussion where we will list the answers on the whiteboard.

#### Do's could include:

- Record in 44.1 KHz (CD quality) and compress the file after that.
- Monitor the recording levels before and during recording
- Record with the microphone close to the speaker's mouth.
- Select your recording source in Audacity's "Preferences" menu

**Don'ts could include:**

- Don't start the recording utilizing an inferior sample rate.
- Don't worry about making mistakes, you can edit those out.
- Don't record more than one audio track at a time if you're only utilizing a single track.

**Summative Assessment**

For the summative assessment of this project, the students will create, in class, a very short audio recording where they will utilize their headset microphone to create a digital self-introduction recording. The recorded audio should be free of distortion and have a sample rate of 44.1 KHz. Additionally, the recording will have at least one audio edit using the "copy and paste" function. This project will be assessed by me upon the student finishing the project. Because I will be able to recognize issues of distortion, sample-rate problems, and noise-floor inconsistencies visually by using each students' Audacity interface, I will be able to quickly and easily make this assessment without actually having to listen to each recording. A good recording should visually demonstrate adequate recording levels and will show the point of editing.

The rationale for this assessment is that through the creation of the digital audio, it will be immediately clear if the student utilized the concepts within the learning outcome. For example, I will be able to see via the student's computer monitor if the recording is between 0-3db (understanding the noise-floor), if the track has been successfully edited (being able to edit digital audio), what the sampling rate is (on the Audacity display), and if there is distortion (which is demonstrated by the shape of the waveform). Therefore, the student's recorded digital audio file will serve as the only rubric for this project.

**Section 4: Session Outline**

Time (in minutes)	Task	Details
3 (0:05)	Introduction	<ul style="list-style-type: none"> <li>- Welcome everyone to the class.</li> <li>- Make sure there is one person for each computer.</li> <li>- Introduce myself (give my name and position, tell the class that I've recorded music and radio using Audacity).</li> <li>- State goal of class (to be able to adequately create digital audio).</li> <li>- Pass out the handout</li> </ul>
4 (0:07)	Class overview	<ul style="list-style-type: none"> <li>- I will explain to the class that first, we will be talking about digital audio concepts, next we will record some audio using our USB headset. After that, the class will edit their digital audio. Finally, the class will export their audio as an MP3.</li> <li>- I will talk about the benefits of Audacity (free, easy to use, professional quality results).</li> <li>- Briefly mention that everyone is welcome to speak up if they have a problem. There can be some new terminology but this should be fun!</li> </ul>

5 (0:12)	Demonstrate the benefit of learning this materials	<ul style="list-style-type: none"> <li>- Ask class to name some potential benefits of being able to create suitable digital audio (answers can include creating promo materials for their library, creating online lectures, creating podcasts, etc.).</li> </ul>
7 (0:19)	Audio Recording Concepts	<ul style="list-style-type: none"> <li>- Explore concepts of good and bad recordings. Briefly ask class what they think makes a recording “good” and what makes it “bad.” I am looking to build on already familiar concepts of noise floor (making sure the recording is at a suitable level and there’s not excessive noise), distortion (making sure the recording wasn’t originally recorded so loud it is hard to understand what the recording is of), and sampling rate (avoiding a recording which sounds overly “digital” or “tinny”).</li> <li>- From this conversation, incorporate and summarize the three concepts of noise-floor, distortion and sample rate. I will demonstrate what distorted audio visually looks like.</li> <li>- Explain what sample rate is. Show visual demonstration of a pure waveform versus a digital waveform.</li> <li>- State this class will be recording using 44.1Khz. The reason we want to record in CD quality is because we want the best possible sound quality before we start compressing the file.</li> <li>- re-emphasize that students should speak up if they experience any issues with the recording process or if they have any questions.</li> </ul>
7 (0:26)	Beginning the recording process	<ul style="list-style-type: none"> <li>- Recognize the Audacity icon on the students’ desktop. Start the Audacity.</li> <li>- Explain what the students are seeing on the Audacity screen via my overhead computer. Point out the recording console (record, play, stop buttons) and the track console.</li> <li>- Go into preferences and select “USB recording device.” Select the 44.1 KHz sampling rate option.</li> <li>- Test audio levels by having each student speak into their headset and using the audio level monitor. Explain that we want the audio recording level to be in the yellow but not red.</li> </ul>
4 (0:30)	Formative Assessment (critical thinking)	<ul style="list-style-type: none"> <li>- Ask the students to each come up with two Dos and Don’ts of the recording process. Ask the students to share their results. Write them on the whiteboard.</li> </ul>

3 (0:33)	Script Instruction	<ul style="list-style-type: none"> <li>- Tell the class that for their recordings they'll be speaking their name, alma mater, the library or institution that we work for, and how long they have worked at that library. This recording will be about 15 seconds long.</li> <li>- Tell the students to talk clearly and calmly during their recordings.</li> </ul>
8 (0:41)	Recording (Active Learning)	<ul style="list-style-type: none"> <li>- Have each student record their script utilizing their headset microphone and Audacity.</li> <li>- Have the students next record the statement "My dream vacation would be in the.." This recording will automatically record on a new track.</li> <li>- Help anyone who has any questions.</li> </ul>
8 (0:49)	Editing	<ul style="list-style-type: none"> <li>- Evaluate the students' recordings by examining the wav file display on their computer.</li> <li>- Show students, via the overhead computer, how to highlight audio and adjust the volume.</li> <li>- Have the students select the "vacation" audio track, highlight it, copy it, and paste it at the end of their "introduction" recording (thus combining two audio tracks into one and demonstrating editing capabilities).</li> <li>- Cut and trim beginning and end of the audio file.</li> <li>- Re-evaluate the recordings on the students' computer monitors.</li> </ul>
5 (0:55)	Export	<ul style="list-style-type: none"> <li>- Explain export format options (i.e. MP3, WAV, AIFF). We will be exporting to the common MP3 file type.</li> <li>- Encourage critical thinking by having a discussion regarding what file types and sample rates are appropriate for what situations (MP3 online quality, WAV high fidelity but large file, etc.).</li> </ul>
5 (1:00)	Questions	<ul style="list-style-type: none"> <li>- Resolve and problems that may come up and ask if anyone needs any additional help or has questions.</li> <li>- Explain that there are many online resources for Audacity and many other types of recording programs.</li> <li>- Let everyone know that I'm always available to chat.</li> <li>- Thank the class.</li> </ul>

## Section 5: Discussion

- A. ACRL Standard 3.1 states that “The information literate student summarizes the main ideas to be extracted from the information gathered.” This is a concept I incorporate as I am providing students with the ability to summarize the important concepts (i.e. noise floor, sample rate, and distortion) in the popular medium of digital audio by speaking about such concepts in class and incorporating them into their projects. I encourage students to think critically about these concepts and use such critical thinking skills to understand digital audio. Such critical thinking comes at 0:30 of the class when I ask students to write down two dos and don’ts of the digital recording process. I also encourage critical thinking at 0:55 when I have the students discuss what sample rates are appropriate for what situations.

ACRL Standard 4.1 states that “The information literate student applies new and prior information to the planning and creation of a particular product or performance.” I address this standard by providing students with the new information regarding the concepts of digital recording (i.e. sample rate, noise floor, and distortion) and having them incorporate those concepts into the creation of their digital audio file. Thus, the students take these freshly learned concepts and utilize them in the creation of their digital audio file.

- B. The learning outcome for my project that requires critical thinking states that “Students will be able to explain the importance of the concepts of clipping/distortion, noise floor, and sample rate in digital audio.” I encourage critical thinking by having students discuss what are appropriate situations for utilizing different sample rates as well as listing dos and don’ts of the recording process. This very closely fits within Bloom’s taxonomy by having students understand and apply learned concepts. That said, my entire lesson was constructed Bloom’s taxonomy in mind. First, I introduce the concepts (or knowledge) of noise floor, sample rate, and distortion. Secondly, I enforce comprehension (and invoke critical thinking) by having a class discussion about what the best times to use different sample rates in different applications is. Third, students apply the concepts that they have just learned in setting up the recording preferences in Audacity and creating a digital audio file. Students then use their analysis skills to break down the recording process into smaller decisions such as bit rate selection and how to successfully recognize and monitor the recording levels. The final evaluation process comes when the recording is complete and the student (and instructor) can determine the quality of the recording. Again,
- C. Active learning is essential to my course and it is a strategy that I utilize in depth. This strategy is demonstrated by providing the digital audio concepts to my classroom and then having each student record their own digital audio piece. This individualized recording will allow the student to synthesize concepts that we previously discussed

into a hands on demonstration. I will be roaming the classroom to help if any questions arise. Furthermore, I will provide a handout with the important terminology that the student will be able to refer to. This strategy is reflective of the strategy of trying to find different ways to engage student's in the learning experience. It is my hope that by providing different active learning activities, students won't get bored, I'll avoid cognitive overload, and the class will generally be more enjoyable.

- D. Because my subject is rather dense, and does include some jargon, applying universal design concepts is a little tricky, but admittedly important. I have tried to provide information presented in different ways that any individual will be able to follow. For example, I will provide clear overhead instruction on my own computer which is displayed to the entire class. This will reflect the subject that I am speaking about. I will also provide a clear handout in which the students will be able to read the important concepts and terminology as I state them. These combined strategies are important for engaging students and providing the adequate stimulation to help them achieve a successful learning outcome.

**See next page for handout**